ERIC Document Resume	See Instruction Sheet	DATE OF RESUME	DATE RECEIVED

A. PUBLICATION DATA

1. ERIC NUMBER	2. ORIGINATOR CONTROL NO(S).	3. IDENTIFICATION NO.
ED001617	N.A.	N.A.

DO NOT WRITE IN SPACE BELOW

4. AUTHOR(S):
Garber, Claire N.

5. TITLE OF DOCUMENT ABSTRACTED:
Great Cities School Improvement Program,
School District of Philadelphia
Grade Five, Arithmetic

6. PUBLICATION TITLE:
N.A.

7. EDITOR(S):
N.A.

8. PLACE OF ORIGIN
ORG. Great Cities School Improvement Program
CITY, STATE Philadelphia, Pa.

9. PUBLISHER OR SOURCE
Great Cities School Improvement Program
School District of Philadelphia

10. VOL.	11. PAGES	12. MO./YR.	13. TOTAL PP.
N.A.	N.A.	3/64	4

TELE. EXT.
INST/LOC CODE

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TYPE OF REPORT
PROPOSAL ☐
IN-PROGRESS ☐
FINAL ☒
FOLLOW-UP ☐

OTHER ERIC REFERENCES:

ERIC SATELLITE CODE

B. INDEXING DATA

14. SUBJECT AREA

15. TYPE OF ENDEAVOR
teacher guide

16. INDEXING TERMS (6-12)

number systems	number use	fifth grade	culturally disadvantaged
whole numbers	elementary education	teaching approaches	
fractions	arithmetic curriculum	Great Cities School Improvement Program	
		Philadelphia, Pennsylvania	

17. ABSTRACT (MAX. 250 WORDS)

Fifth grade work should continue the sequential development of mathematical understandings and computational skills. The problems approach should be used so children may discover mathematical truths and arrive at generalizations.

The number system unit should emphasize the ability to read and write numerals to six places and the ability to read and write Roman numerals to the thousands.

The study of whole numbers should include addition and subtraction to five place numbers, multiplication to three place multipliers, and division to two place divisors.

The study of fractions should involve the systematic study of parts and the addition, subtraction, and multiplication of fractions.

Number use should involve deeper exploration into weights and measures, graphs and charts, geometric figures, and vocabulary.

Specific teaching approaches are suggested and illustrated.

ERIC No.

18. SOURCE OF ABSTRACT

C. FUNDING DATA

19. SUPPORTING ORGANIZATION	20. DIVISION OR DEPT.	21. CONTRACT NO. / PROJECT NO.
	22. TOTAL COST OF PROJECT	
	23. DURATION OF PROJECT	U.S. Department of Health, Education, and Welfare Office of Education

ERIC Form 1

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ED0016117

GREAT CITIES SCHOOL IMPROVEMENT PROGRAM
SCHOOL DISTRICT OF PHILADELPHIA

GRADE FIVE

Claire N. Garber
Arithmetic Consultant
March 1964

GREAT CITIES SCHOOL IMPROVEMENT PROGRAM
SCHOOL DISTRICT OF PHILADELPHIA

GRADE FIVE

The fifth grade work continues the sequential development of mathematical understandings, and computational skills. The problem approach is used so that the children can discover mathematical truths and arrive at generalizations.

I. Number System

A. Read and write numerals to six places.

1. Review the meaning of place value.
2. Teach absolute and relative values.

463,752 = 4 hundred thousands + 6 ten thousands + 3 thousands + 7 hundreds + 5 tens + 2 ones.

= 46 ten thousands + 3 thousands + 7 hundreds + 5 tens + 2 ones.

= 463 thousands + 7 hundreds + 5 tens + 2 ones.

= 4,637 hundreds + 5 tens + 2 ones.

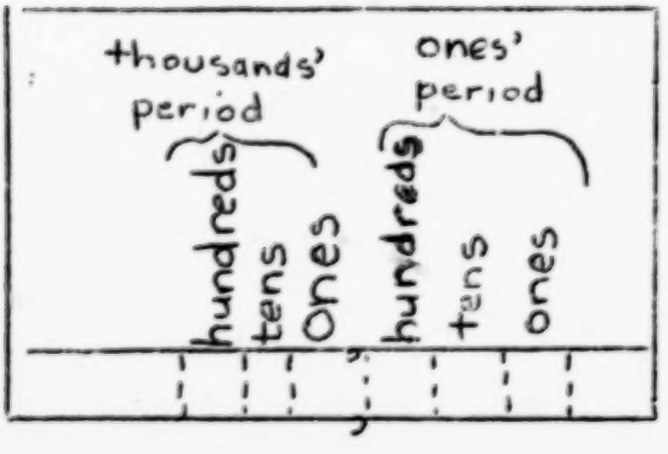
= 46,375 tens + 2 ones.

= 463,752 ones.

We read this: four hundred sixty-three thousands, 7 hundred fifty-two.

AVOID THE USE OF "AND" WHEN READING WHOLE NUMBERS

3. Use Charts.



4. Generalizations.

.. In our number system the positions of the ten digits indicate values of ones, tens, hundreds, thousands, etc.

.. Each position has ten times the value of the position to its right.

.. Each position is $\frac{1}{10}$ the value of the position to its left.

.. Each period contains ones, tens, and hundreds and is separated from other periods by commas.

B. Read and write Roman numerals to thousands.

1. Review the history of numerals.
2. Illustrate the use of letters and tally marks.
3. Compare with the decimal system.

II. Study of Whole Numbers

A. Extend addition to five place numbers.

1. Review the concept of addition.
2. Review generalization - all place value numbers are added like ones.
3. If necessary review bridging of tens.
4. If necessary review addition in higher decades.
5. Drill addition facts.
6. Practice rounding off numbers.
7. Estimate answers.
8. Check addition by adding in opposite direction - commutative law.
9. Extend learning by practicing non-traditional methods of addition.

B. Extend subtraction to five place numbers.

1. Review the concepts of subtraction making sure the three concepts (take-away, comparison and adding-to) are understood.
2. Review the idea that subtraction is the inverse of addition.
3. Review the idea of regrouping.
4. Drill subtraction facts.
5. Estimate answers.
6. Check answers.
7. Extend learning by subtracting in non-traditional methods.

C. Extend multiplication to three place multipliers

1. Review the concept of multiplication.
2. Relate multiplication to addition.
3. Review the idea that multiplication is the inverse of division.
4. Drill multiplication facts.
5. Review regrouping in multiplication.
6. Estimate answers.
7. Check answers.
8. Extend learning by multiplying in non-traditional methods.

D. Extend division to two place divisors.

1. Review concepts in division making sure the children understand the two concepts (containing and partitioning or sharing).
2. Relate division to subtraction.
3. Review the idea that division is the inverse of multiplication.
4. Divide by two place divisors with quotients that are self-evident and where the estimated quotient is the true quotient.

$$10\overline{)90}\quad 9,\ 90 \qquad 30\overline{)150}\quad 5,\ 150 \qquad 23\overline{)69}\quad 3,\ 69$$

Generalizations:

.. Dividing by tens is the same as dividing by ones.
.. To divide by tens, use the first number in the divisor to help estimate the quotient.

5. Practice estimating the quotient and writing the numerals in the proper place in the quotient.
6. Determine the partial divident. Use the plus (+) sign to indicate a remainder.

$$50\overline{)303}\quad 6+,\ 300,\ 3$$

7. Let the children discover the steps in division after many experiences with dividing.
8. Help the children to do the same algorisms several ways.

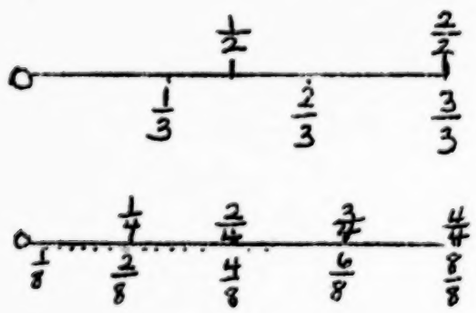
III.. Study of Fractions

A. Systematic study of parts.

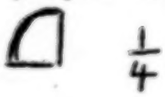
1. Review concept of numerator and denominator.
2. Compare fractions of different sizes.

Which is larger $\frac{1}{3}$ or $\frac{1}{4}$ of the same group?
Which is smaller $\frac{1}{8}$ or $\frac{1}{6}$ of the same circle?

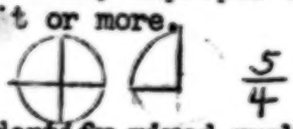
3. Use a number line to show relative values of fractional parts.



4. Define and identify proper fractions - fractional part less than a whole.

 $\frac{1}{4}$

5. Define and identify improper fractions - fractional parts that equal one unit or more.

 $\frac{5}{4}$

6. Define and identify mixed numbers - a whole number and a fractional part.

$1\frac{1}{4}$

7. Reduce fractions to lowest terms.
   - Guide children to discover that fractional parts can be put together to form one larger part if the value is not changed. Hence, $\frac{4}{8} = \frac{1}{2}$.
   - At the abstract level children find that they are dividing the numerator and the denominator by the same number. This process is the s ame as dividing by one; therefore, the value of the fraction does not change.

8. Find common denominators.
   - Guide children to discover the need in addition and subtraction.
   - Illustrate that the value of the fraction does not change when the numerator and the denominator are multiplied by the same number. This process is the same as multiplying the fraction by one.

B. Addition and subtraction of fractions.

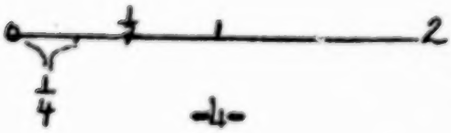
1. With the use of concrete materials the children discover we add and subtract numerators.
2. When there is a need to change the fractions so that they have a common denominator we can do so.
3. Reduce answers to lowest terms.

C. Multiplication of fractions.

1. Introduce multiplication concretely; also, use a number line.
2. Reemphasize the function of the multiplier and the interpretation of the multiplication sign (x) as "of."

$\frac{1}{2} \times (\text{of}) \; 2 = 1$

$\frac{1}{2} \times (\text{of}) \; 1 = \frac{1}{2}$



$\frac{1}{2} \times (\text{of}) \; \frac{1}{2} = \frac{1}{4}$

3. Guide the children to arrive at the generalizations:

... When we multiply a fraction by a fraction, we multiply numerator by numerator and denominator by denominator.

... When we multiply a fraction and a whole number, our answer is always smaller than the whole number.

... When we multiply a fraction by a fraction the answer is always a smaller part.

IV. Use of Number

A. Weights and measures.

1. Extend the study of time to include time zones in the United States.
2. Extend the study of the linear measure to include feet and yards in a mile. (5280 feet, 1760 yard)
3. Extend the study of quantity measures to include pounds in a ton, and the concept of basket and barrel as units of measure.
4. Extend the study of measuring the temperatures to Centigrade and Fahrenheit.

B. Graphs and charts.

1. Extend the use of graphs and charts into other curriculum areas.
2. Make simple scale drawings.
3. Develop the concepts of median and average scores.

C. Geometric figures.

1. Recognize forms: circle, semi-circle, sphere, hemisphere, cube, triangle, rectangle.
2. Recognize square inch, square foot and square yard.
3. Find areas of rectangles.
4. Read maps - concept of square mile.

D. Vocabulary.

1. Develop vocabulary from meaningful experiences.
2. Vocabulary is primarily a speaking and reading one.

E. Enrichment.

1. Extend each learning to develop insight, appreciation, and interest in arithmetic.

John Olivera
Ferguson School
March 1964

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